Cluster Management and Maintenance

Rocks-A-Palooza II

Lab Session

SDSC

What We'll Be Doing

- Adding content to frontend's web site
- Discuss how to add new packages to compute nodes
- How to change configuration on compute node
- Adding an application to the compute nodes
- Discuss frontend and compute node partitioning
- Configuring additional ethernet interfaces on compute nodes

Add Content to the Frontend's Web Site

Adding Content to the Frontend's Web Site

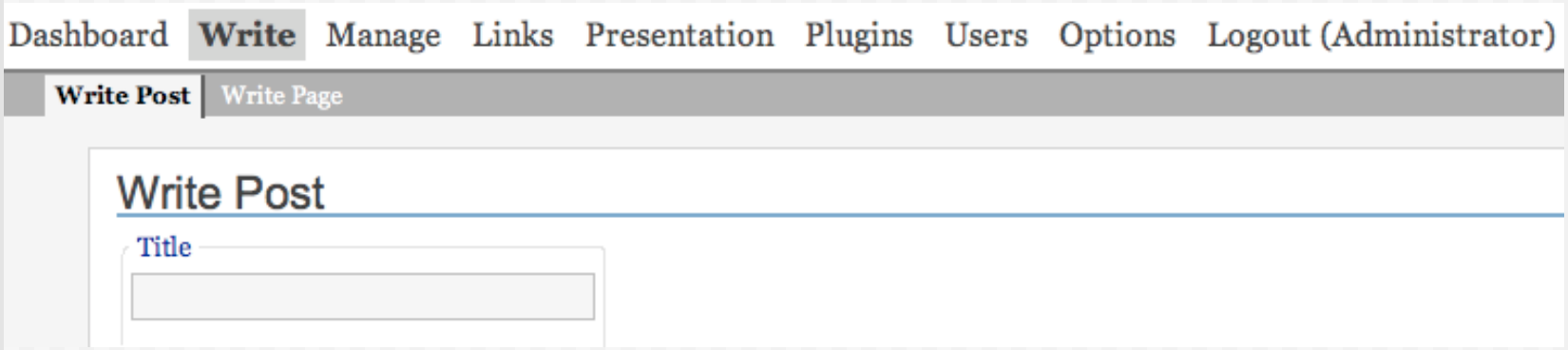
- First, configure X
  - # system-config-display
- Start the X window server
  - # startx

Adding Content To Frontend's Web Site

- Connect to web page
  - # firefox http://localhost/
- Click on link at bottom of page:
  - "Add content to this web site"
- Next screen you see 'Login/Password'
  - Login = 'admin'
  - Password = same as root password on frontend

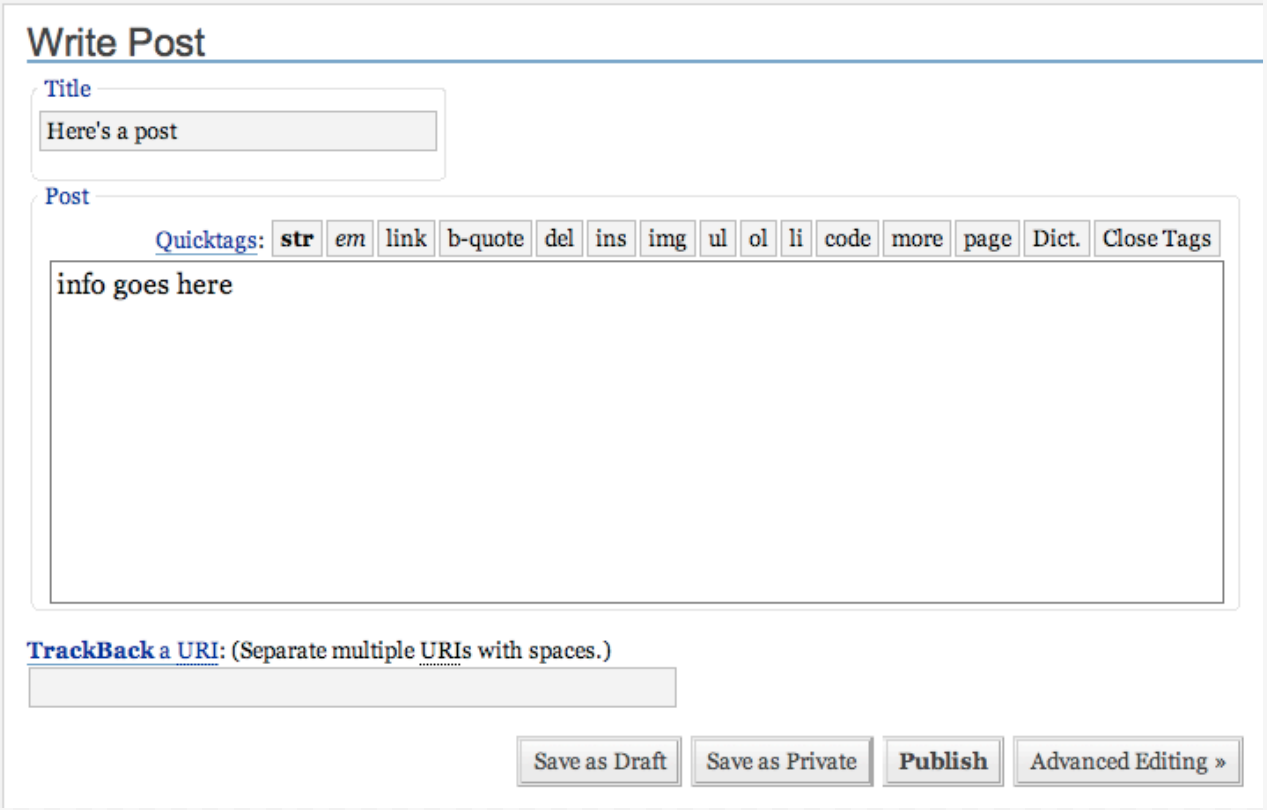
Adding Content To Frontend's Web Site

- Click 'Write' tab



Adding Content To Frontend's Web Site

- Write your 'post', then 'publish'



Adding Content To Frontend's Web Site

- View your new web site at:
  - http://localhost/

Add A New Package

Adding a New Package to the Distribution

- All packages are found under '/home/install'
- Put the new package in /home/install/contrib/4.1/i386/RPMS
  - Where <arch> is 'i386', 'x86_64' or 'ia64'
- "Extend" an XML configuration file
- Rebind the distro:

```
# cd /home/install
# rocks-dist dist
```

- Apply the changes by reinstalling the compute nodes:
  - "shoot-node compute-0-0"

Extend the “Compute” XML Configuration File

- To add the package named “strace”

```
$ cd /home/install/site-profiles/4.1/nodes
$ cp skeleton.xml extend-compute.xml
```

- In ‘extend-compute.xml’, change:

```
<package> <!-- insert your 1st package name here --> </package>
```

- To:

```
<package>strace</package>
```

Extend the “Compute” XML Configuration File

- Rebind the distro
  - This copies ‘extend-compute.xml’ into /home/install/rocks-dist/…/build/nodes

```
# cd /home/install
# rocks-dist dist
```

- Test the changes
  - Generate a test kickstart file

```
# dbreport kickstart compute-0-0 > /tmp/ks.cfg
```

  - You should see ‘strace’ under the ‘%packages’ section

Extend the “Compute” XML Configuration File

- When you are satisfied with the changes, reinstall a compute node

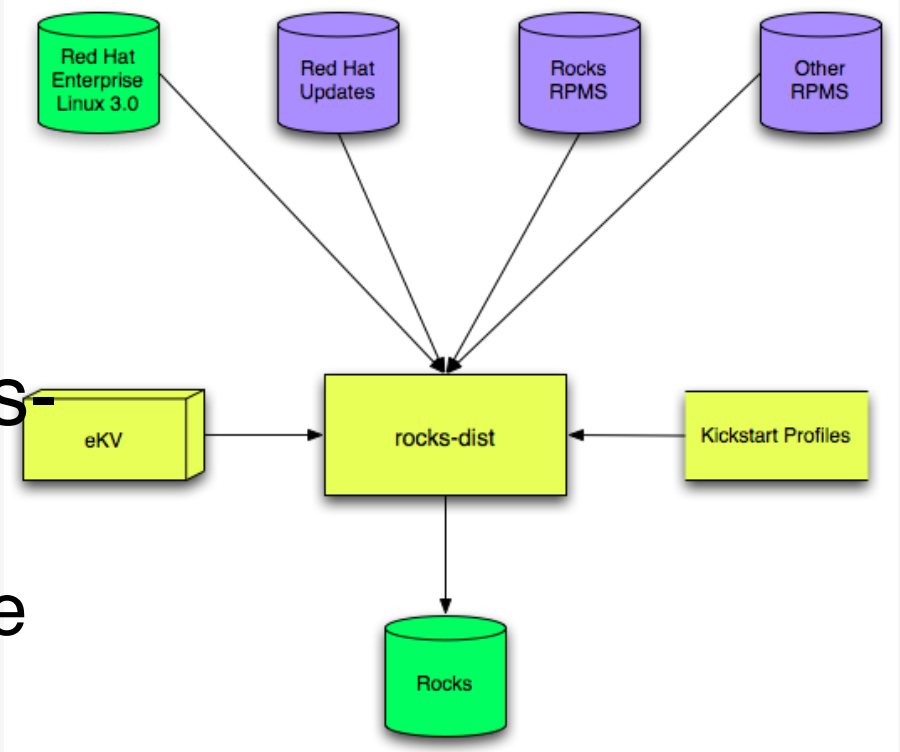
```
# shoot-node compute-0-0
```

More on the Distro

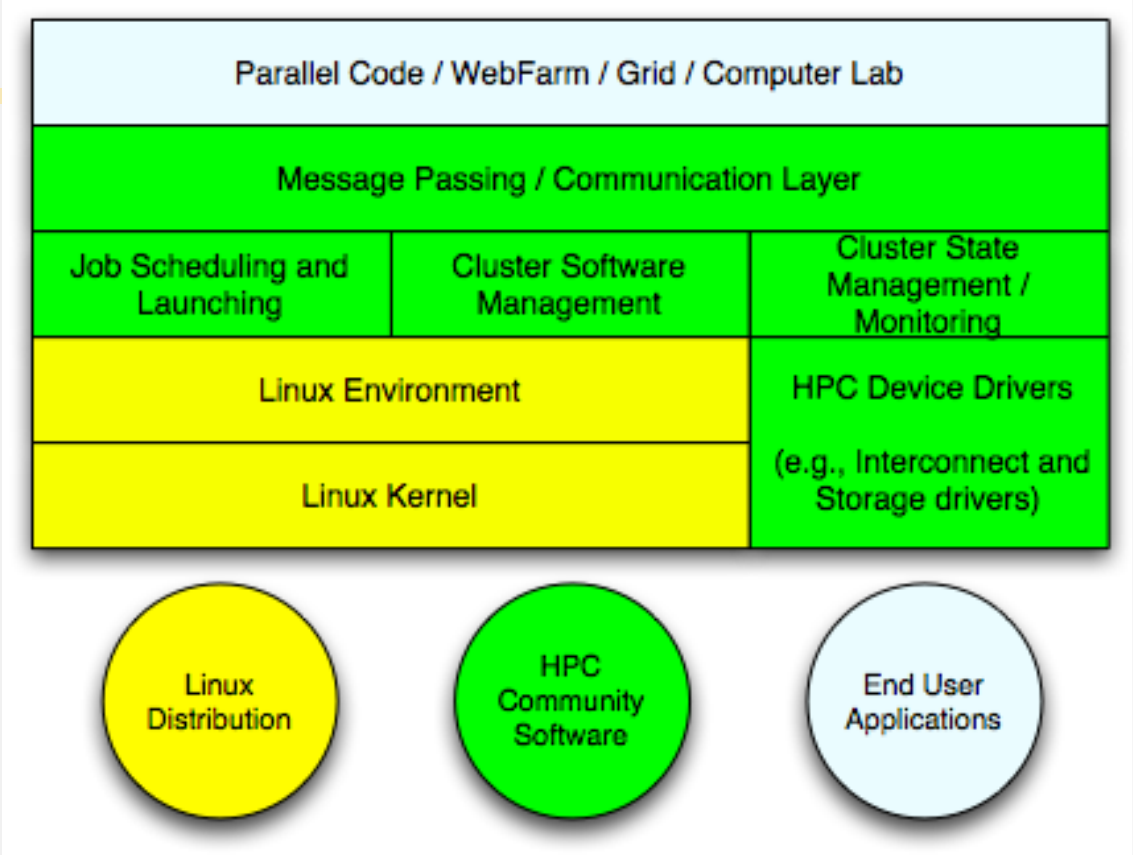
- Rocks-dist looks for packages in:
  - "/home/install/ftp.rocksclusters.org"
    - RedHat and Rocks packages
  - "/home/install/contrib"
    - Pre-built 3rd party packages
  - "/usr/src/redhat/RPMS"
    - RedHat default location for 'built' packages
    - But, when building packages in Rocks source tree, packages are not placed here
      - The packages are placed local to the roll source code

More on the Distro

- Any time you add a package to the distro, you must re-run “rocks-dist dist”
  - Rocks-dist binds all the found packages into a RedHat-compliant distribution



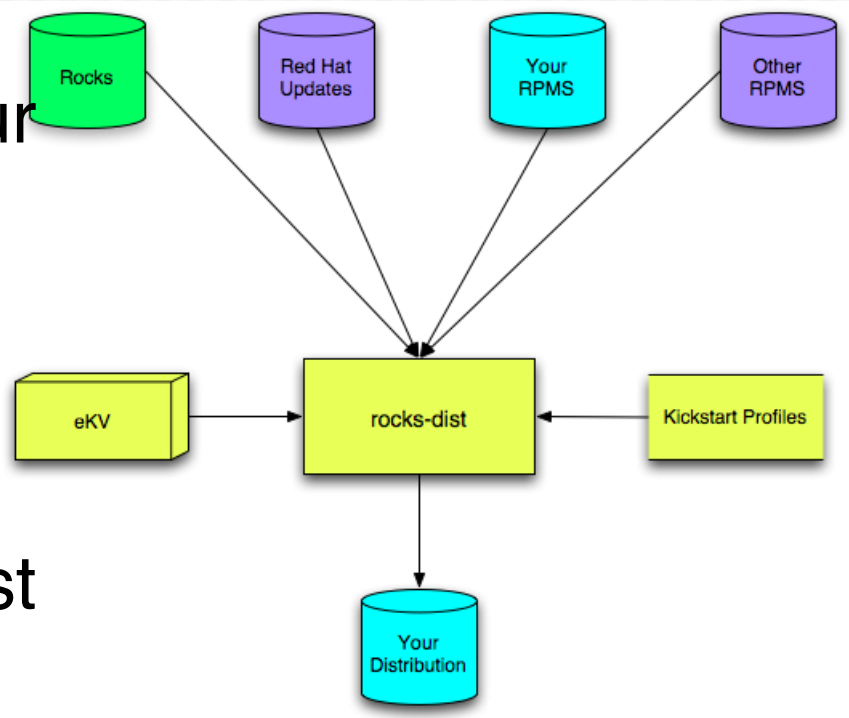
More on the Distro



- Rocks-dist assembles a RedHat compliant distribution

Your Distro - Extending Rocks

- You can use “rocks-dist” to build and distribute your own distribution
  - Merges RPMS
  - Resolves versions
- Final distribution looks just like Rocks
  - And, Rocks looks just like RedHat



Add an Application to the Compute Nodes

Default NFS Share

- By default, each node has access to NFS shared directory named '/share/apps'
- The actual location is on the frontend
  - '/export/apps' on the frontend is mounted on all nodes as '/share/apps'
- Simply add directories and files to /export/apps on frontend

Default NFS Share - Example

- On frontend:

```
# cd /export/apps
# touch myapp
```

- On compute node:

```
# ssh compute-0-0
# cd /share/apps
# ls
myapp
```

Default NFS Share Adding ‘bonnie’

- Bonnie is a file system benchmark
  - See ‘Introduction to Benchmarking’ Lab
- We’ll download the source and build it
  - On frontend:

```
# cd /share/apps
# mkdir benchmarks
# mkdir benchmarks/bonnie++
# cd benchmarks/bonnie++
# mkdir bin src
# cd src
# wget http://www.coker.com.au/bonnie++/bonnie++-1.03a.tgz
```

Adding bonnie

- Build and install it:

```
# tar -zxvf bonnie++-1.03a.tgz
# cd bonnie++-1.03a
# ./configure --prefix=/share/apps/benchmarks/bonnie++
# make ; make install
```

- You can now run it on a compute node:

```
# ssh compute-0-0
# mkdir ~/output_files
# cd /share/apps/benchmarks/bonnie++/sbin/
# ./bonnie++ -s 100 -r 50 -u root -n 0 -f -d ~/output_files
```

Package bonnie as an RPM

- Checkout the Rocks development source tree

```
# cd /export
# mkdir src
# cd src
# cvs -d:pserver:anonymous@cvs.rocksclusters.org:/home/cvs/CVSROOT login
# cvs -d:pserver:anonymous@cvs.rocksclusters.org:/home/cvs/CVSROOT checkout  rocks-devel
```

Create a Benchmark Roll

- Use the ‘template’ roll to populate a skeleton ‘benchmark’ roll

```
# cd rocks/src/roll/
# bin/make-roll-dir.py -n benchmark
```

- Create directory for bonnie

```
# cd benchmark/src
# mkdir bonnie
```

Create a Bonnie RPM

- Get build files

```
# cd bonnie
# cp ../benchmark/Makefile .
# cp ../benchmark/version.mk .
```

- Get the source

```
# wget http://www.coker.com.au/bonnie++/bonnie++-1.03a.tgz
```

Create a Bonnie RPM

- Update version.mk to match source
  - Change:

```
NAME           = benchmark
VERSION        = 1
RELEASE        = 1
TARBALL_POSTFIX = tgz
```

  - To:

```
NAME           = bonnie++
VERSION        = 1.03a
RELEASE        = 1
TARBALL_POSTFIX = tgz
```

Create a Bonnie RPM

- Build the RPM

```
# make rpm
```

- You see lots of output
  - The last line shows you where the resulting binary RPM is:

```
Wrote: /export/src/rocks/src/roll/benchmark/RPMS/i386/bonnie++-1.03a-1.i386.rpm
```

Create a Bonnie RPM

- View the RPM contents

```
# rpm -qlp /export/src/rocks/src/roll/benchmark/RPMS/i386/bonnie++-1.03a-1.i386.rpm
```

- Which outputs:

```
/
/opt
/opt/benchmark
/opt/benchmark/bonnie++
/opt/benchmark/bonnie++/bin
/opt/benchmark/bonnie++/bin/bon_csv2html
/opt/benchmark/bonnie++/bin/bon_csv2txt
/opt/benchmark/bonnie++/man
/opt/benchmark/bonnie++/man/man1
/opt/benchmark/bonnie++/man/man1/bon_csv2html.1
/opt/benchmark/bonnie++/man/man1/bon_csv2txt.1
/opt/benchmark/bonnie++/man/man8
/opt/benchmark/bonnie++/man/man8/bonnie++.8
/opt/benchmark/bonnie++/man/man8/zcav.8
/opt/benchmark/bonnie++/sbin
/opt/benchmark/bonnie++/sbin/bonnie++
/opt/benchmark/bonnie++/sbin/zcav
```

Copy the bonnie++ RPM so rocks-dist Can Find It

- All packages are found under '/home/install'
- Put bonnie++ RPM package in /home/install/contrib/4.1/<arch>/RPMS
  - Where <arch> is 'i386', 'x86_64' or 'ia64'

```
# cd /home/install/contrib/4.1/i386/RPMS
# cp /export/src/rocks/src/roll/benchmark/RPMS/i386/bonnie++-1.03a-1.i386.rpm .
```

Extend the “Compute” XML Configuration File

- To add the package named “bonnie++”

```
$ cd /home/install/site-profiles/4.1/nodes
$ vi extend-compute.xml
```

- In ‘extend-compute.xml’, change the section:

```
<package>strace</package>
```

- To:

```
<package>strace</package>
<package>bonnie++</package>
```

Extend the “Compute” XML Configuration File

- Rebind the distro
  - This copies ‘extend-compute.xml’ into /home/install/rocks-dist/…/build/nodes

```
# cd /home/install
# rocks-dist dist
```

- Test the changes
  - Generate a test kickstart file

```
# dbreport kickstart compute-0-0 > /tmp/ks.cfg
```

  - You should see ‘bonnie++’ under the ‘%packages’ section

Extend the “Compute” XML Configuration File

- When you are satisfied with the changes, reinstall a compute node

```
# shoot-node compute-0-0
```

Custom Partitioning

Default Frontend Partitioning

- 6 GB for /
  - Applications
  - Configuration files
  - Log files
- 1 GB swap
- Rest of first drive is /export
  - Home directories
  - Rocks distribution

Modifying Frontend Partitioning

- Can only change during frontend installation
- Note: must have '/export'
  - /export is automatically mounted by all compute nodes

Default Compute Node Partitioning

- 6 GB for / on first disk
- 1 GB for swap on first disk
- Remainder of first disk
  - Partitioned as “/state/partition1”
- All non-root partitions are saved over reinstalls

Changing Size of Root and Swap on a Compute Node

- If just want to change size of root and swap, only need to change two variables
- Create the file “extend-auto-partition.xml”

```
# cd /home/install/site-profiles/4.1/site-nodes/
# cp skeleton.xml extend-auto-partition.xml
```

- Above the “<main>” section, add the two variables

```
<var name="Kickstart_PartsizeRoot" val="10000"/>
<var name="Kickstart_PartsizeSwap" val="2000"/>
```

  - Above XML variables will create a 10 GB root partition and a 2 GB swap partition
- Rebind the distro (rocks-dist dist) and reinstall a compute node (shoot-node compute-0-0)

Specifying a New Partition Layout

- Only requirement is that '/' is "big enough"
- Create the file "extend-auto-partition.xml"

```
# cd /home/install/site-profiles/4.1/site-nodes/
# cp skeleton.xml extend-auto-partition.xml
```

- In the "<main>" section, add (assumes disk name is 'hda'):

```
<main>
        <part> / --size 9000 --ondisk hda </part>
        <part> swap --size 1000 --ondisk hda </part>
        <part> /mydata --size 1 --grow --ondisk hda </part>
</main>
```

- Rebind the distro (rocks-dist dist) and reinstall a compute node (shoot-node compute-0-0)

Specifying Software RAID

- Create the file “extend-auto-partition.xml”

```
# cd /home/install/site-profiles/4.1/site-nodes/
# cp skeleton.xml extend-auto-partition.xml
```

- In the “<main>” section, add:

```
<main>
        <part> / --size 8000 --ondisk hda </part>
        <part> swap --size 1000 --ondisk hda </part>
        <part> raid.00 --size=10000 --ondisk hda </part>
        <part> raid.01 --size=10000 --ondisk hdb </part>

        <raid> /mydata --level=1 --device=md0 raid.00 raid.01 </raid>
</main>
```

- Rebind the distro (rocks-dist dist) and reinstall a compute node (shoot-node compute-0-0)

Testing Changes

- Use:
  - “dbreport kickstart compute-0-0 > /tmp/ks.cfg”
- Should not see any output
  - That is, no error output
- The file “/tmp/ks.cfg” should contain your changes
  - Look for ‘part’ definitions towards the top of /tmp/ks.cfg

Configuring Additional Ethernet Interfaces

Configuring ‘eth1’

- If a compute node has a second ethernet NIC, use the command ‘add-extra-nic’ to assign it an IP address

```
# add-extra-nic --if=<interface> --ip=<ip address> --netmask=<netmask>\
    --gateway=<gateway> --name=<host name> <compute node>
```

Configuring ‘eth1’ - Example

```
# add-extra-nic --if=eth1 --ip=192.168.1.1 --netmask=255.255.255.0 \
    --gateway=192.168.1.254 --name=fast-0-0 compute-0-0
```

- For compute-0-0, the above line sets the following values for ‘eth1’:
  - IP address: 192.168.1.1
  - Name for above IP address: fast-0-0
  - Netmask: 255.255.255.0
  - Gateway: 192.168.1.254

Configuring ‘eth1’

- To apply the change, reinstall the compute node

```
# shoot-node compute-0-0
```